

ASOS MODIFICATION NOTE 75 (for Electronics Technicians)
Maintenance, Logistics, and Acquisition Division
W/OPS12: WDW

SUBJECT	: Installation of ASOS Dewpoint Sensor (Vaisala model DTS1)
PURPOSE	: Instructions for installing the Vaisala DTS1 Dewpoint Sensor on the Automated Surface Observing System (ASOS)
EQUIPMENT AFFECTED	: ASOS DCP (ADCP), or ASOS SCA (ASCA)
PARTS REQUIRED	: 1. DTS1 Dewpoint Sensor S100-2MT4-3 2. DTS1 Mounting Kit S100-FMK75DTS 3. Circuit breaker module (DCP). S100-2A1A3A10 Circuit breaker (SCA) S100-2A1A3A8CB1 4. Fiber Optic Modem S100-2A3A1-1 5. SIO and A/D Boards as identified in Attachment C. 6. 6-inch 14AWG, 2 each, black and white (technician supplied) 7. Round file (technician supplied) 8. 25-foot fish-tape (technician supplied) 9. Modification Note 73, Revision B, if not already installed
MODIFICATION PROCUREMENT	: The parts required will be issued to each site by W/OPS12 from the National Logistics Support Center.
EFFECTIVITY	: All ASOS Sites
ESTIMATED TIME REQUIRED	: 8 hours
EFFECT ON OTHER INSTRUCTIONS	: ASOS Temperature/Dewpoint Sensor (ATDP)
AUTHORIZATION	: This modification is authorized by Request for Change S01143 .
VERIFICATION STATEMENT	: This modification has been tested for operational integrity by the NWS and verified by the sites listed in Attachment A.
SPECIAL INSTRUCTIONS	: The DTS1 requires the New Processor Board (Modification Note 73, Revision B) be installed.

GENERAL:

This modification note provides instructions for installing and configuring the new Vaisala DTS1 Dewpoint Sensor.

INTRODUCTION:

The ASOS Replacement Dewpoint Sensor is the Vaisala model DTS1. This sensor replaces the dewpoint reporting capability of the standard ASOS HO83 or 1088 Hygrothermometer. The 1088/HO83 will be retained as the source of Ambient Temperature. It is possible that the DTS1 will be modified to produce an Ambient Temperature, thereby allowing replacement of the 1088/HO83 entirely.

The DTS1 is mounted on the existing 3-inch pole which currently is used to mount the 1088/HO83. A mounting frame is provided which attaches to the existing pole using U-bolts. The mounting frame contains a short section of 3" pipe, to which the DTS1 mounts. The orientation of the frame is to the North, in line with the centerline of the 1088/HO83 and to the left of the enclosure door. This allows the DTS1 sensor arm to extend in the direction opposite to that of the 1088/HO83 aspirated radiation shield (mushroom).

The DTS1 uses flexible conduit to carry AC power and fiber optic signal cable between the sensor enclosure and the DCP raceway or, in the case of a SCA installation, the rigid conduit that couples to the 1088/HO83 flexible conduit. The DTS1 will use the same path used to supply these cables to the existing 1088/HO83. In the case of DCP installations, a conduit junction box is mounted to the raceway, thereby allowing both 1088/HO83 and DTS1 flexible conduits to be connected to the same wireway opening. For SCA installation, the conduit junction box is attached to the top of the rigid conduit, and is used to supply flexible conduit pathways for both sensors.

BEFORE INSTALLATION OF THE NEW DEWPOINT SENSOR:

1. Call the ASOS Operations and Monitoring Center (AOMC) at 1-800-242-8194 to confirm on which ASOS you will be installing the new dewpoint sensor. Make certain the site-specific data base is available, and upload the current configuration before installing the new dewpoint sensor.
2. Obtain approval from the responsible MIC/OIC/Observer before starting installation. Installation of the new dewpoint sensor may be performed on any day of the month, if restrictions in steps 3 and 4 are satisfied.
3. Commissioned Sites Only: Do not start installation during inclement weather, precipitation, instrument flight rule conditions, or if any of those conditions are expected within 3 hours. The responsible MIC/OIC/Observer will define these meteorological conditions.
4. Do not begin new dewpoint sensor installation when synoptic observations at , 3, 6, 9, 12, 15, 18, and 21Z. Installing the power and fiber optic cabling for this modification can be quite time consuming. Allow approximately eight hours to complete installation and restart ASOS.
5. Immediately before beginning work at NWS staffed sites, the MIC/OIC/Observer will inform the tower, and any other critical users, the ASOS will be turned off for the new dewpoint sensor upgrade. At an unstaffed site, the electronics technician

(ET) will inform the tower, via controller video displays (CVD) and Operator Interface Devices (OID), to log off and shutdown the displays to avoid unnecessary problems.

6. Begin the installation process immediately following the transmission of an hourly observation. At NWS-staffed sites, normal backup observing procedures will be implemented.
7. Sites without a local OID (ie., no RS-232 connected for the primary OID) must attach a terminal to the primary OID port of the ACU 1A9J22, or the Single Cabinet ASOS (SCA) 1A9J19 before proceeding.
8. Use the following steps and upload the current system configuration to the AOMC.



- a. Log on as TECH.
- b. Key to the AOMC page (REVUE-SITE-VERSN-AOMC). Command an upload of all data files except VOICE AIRPORT NAME. Wait for all of the lines to change from "UPLOAD REQ" to "COMPLETE." When complete, key EXIT..

NOTE: DO Not Disable the local OID in step c

- c. Key to the COMMS page (REVUE-SITE-CONFIG-COMMS); disable all hardware and communication ports. The system voice function will automatically broadcast a "not available" message. When complete, key EXIT.
- d. Key to the AOMC page (REVUE-SITE-VERSN-AOMC); cancel the automatic update of the RS-232 comm started by the configuration changes made in step c. When complete, key EXIT.

PROCEDURES:

PART 1 - Sensor Assembly Instructions

1. Open the DTS1 wooden shipping crate and locate the DTS1 power cabling bundle. Remove the red and yellow wires from this cable bundle. The DTS1 sensor is powered using only electronics power, therefore these wires, which normally supply heater power, are not used.
2. To assemble the DTS1 sensor, follow the instructions in Chapter 2 (pages 6 through 12) of the DTS1 User's Guide, included in the wooden shipping crate.

3. There are a few DTS1 sensors without the fiber optic module installed in its electronics enclosure. In this situation, install the fiber optic module must be installed using the supplemental hardware kit provided. Install this module on the din rail to the left of the terminal block as illustrated in Figure 1.

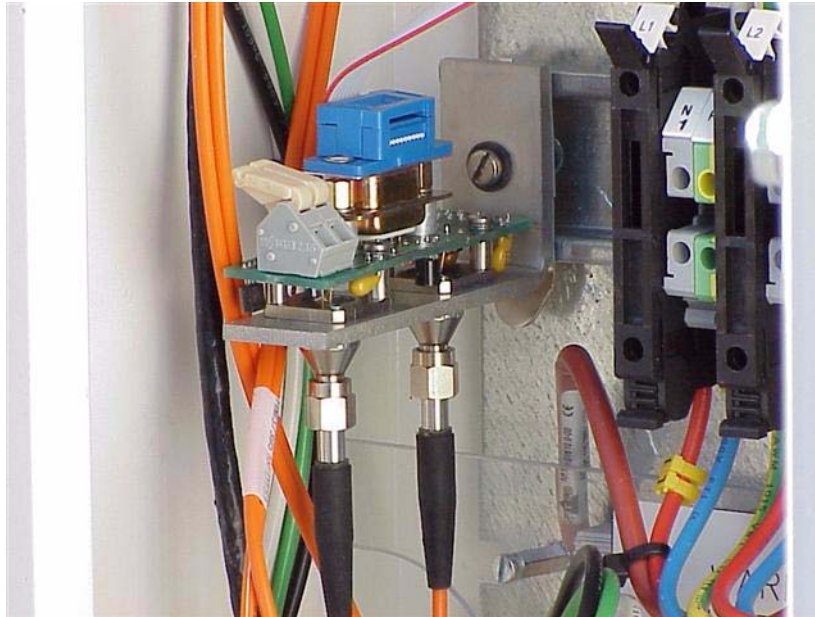


Figure 1. F/O Installation

PART 2 - OID Preparations

NOTE: This section is only for DCP installations. SCA installations must not perform this section until the DTS1 and any associated hardware has been installed.

The New Processor Board, Modification Note 73, Revision B, must be installed before proceeding.

1. At the OID, log onto the system as TECH.
2. If an additional SIO board is required, install the new SIO board now and configure it according to the jumper configuration table on page 2-177 of the *ASOS Site Technical Manual*. Be sure to remove the IACK jumper, on back of the VME rack, at the position where the new SIO is being installed.
3. If an additional A/D board is required, install the new A/D board now and configure it according to the "-20 ASSY" jumper configuration table on page 2-181 of the *ASOS Site Technical Manual*. Be sure to remove the IACK jumper, on the back of the VME rack, at the position where the new A/D board is being installed.

4. Proceed to the Hardware Configuration Page (REVUE-SITE-CONFIG-HDWE) and increase the SIO and/or A/D board quantities accordingly.
5. Proceed to the Sensor Configuration Page (REVUE-SITE-CONFIG-SENSR) and configure the appropriate SIO port that will be connected to the DTS1 as DT.
6. Proceed to the Define Configuration Page (REVUE-SITE-CONFIG-DEFIN) and configure the DEWPOINT sensor as DTS1.
7. Proceed to the Sensor Status Page (REVUE-SENSR-STAT) and turn on report processing for the DEWPOINT sensor.

NOTE: Do not initiate a DCP download.

PART 3 - Site Installation

NOTE: Apply a small amount of anti-seize compound to the threads of each fastener in steps 1 through 5.

1. At the 1088/HO83 mounting pole, install the first L-bracket directly beneath the 1088/HO83 mounting collar. Secure it to the mounting pole using the provided U-bolt, lock washers, and nuts. Refer to Figures 2 and 3.
2. Loosely install the second L-bracket about 2 feet below the first L-bracket.
3. Install the diagonal support between the 2 L-brackets, shifting the lower L-bracket as necessary. Tighten this assembly before proceeding.



Figure 2. DTS1 Installed

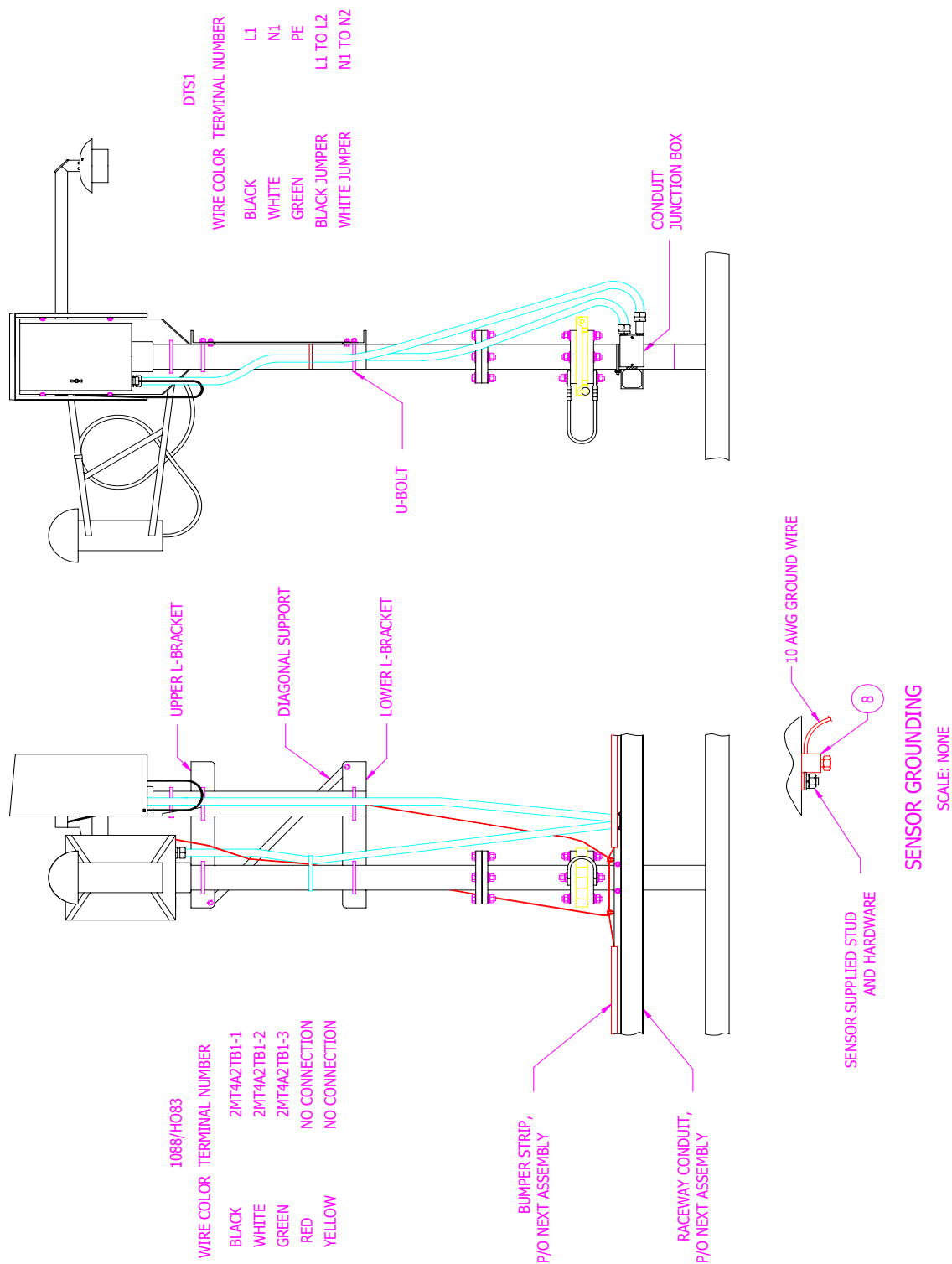


Figure 3. Overall Installation Diagram

4. Install the 3-inch pole section to the L-brackets, making sure the bottom of the pole is flush with the bottom of the lower L-bracket. Refer to Figure 4.



Figure 4. Bottom Bracket

5. While holding the U-bolt supporting bracket (refer to Figure 4, *DTS1 User's Guide*, Page 7) a couple inches from the top of the new mounting pole, install the DTS1 sensor atop the new mounting pole.
6. Remove power from the DCP/SCA and open the Faraday Box.
7. At the existing 1088/HO83 electronics enclosure, disconnect the AC power wires and the fiber optic cables, noting their terminal locations for all connections. Install fiber optic cable end caps.
8. Remove the 1088/HO83 flexible conduit from the bottom of the sensor and from the raceway (or rigid conduit in the case of SCA installations) and pull out the 1088/HO83 cabling from this flexible conduit.
9. Remove the raceway access panel and run a fish tape back to the DCP/SCA.
10. Pull the DTS1 power and fiber optic cabling from the DCP/SCA to the 1088/HO83.

NOTE:	Be extra careful when pulling the DTS1 cables through the raceway. If you hit a snag, carefully work the cabling as to not damage existing fiber optic cables.
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11. Using a round file, remove any burrs from the conduit junction box as necessary to prevent any chafing of the cable assemblies.

12. Assemble the conduit junction box as illustrated in Figure 5.

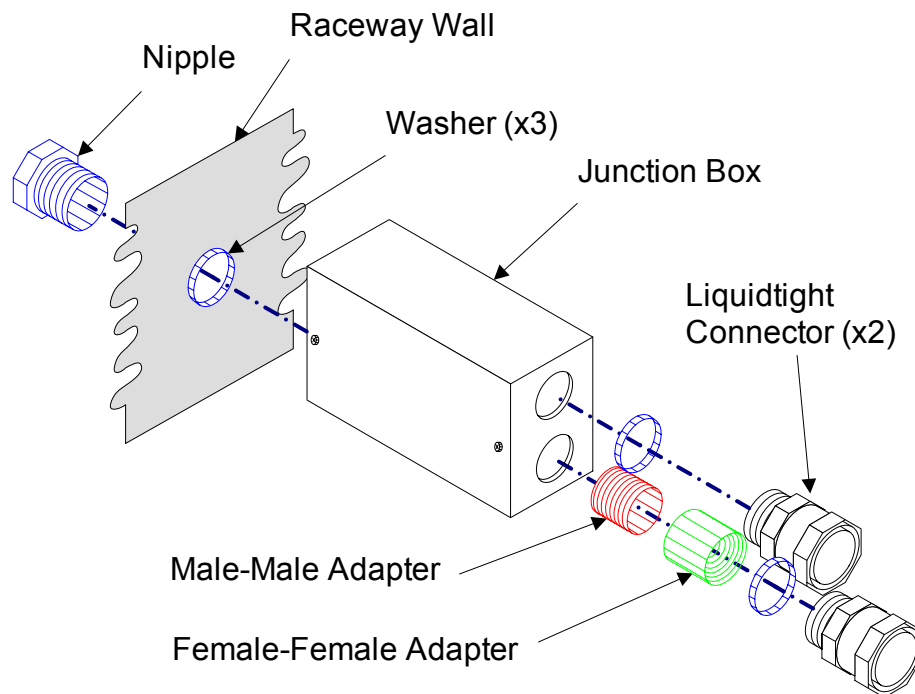


Figure 5. Conduit Junction Box Assembly

13. Remove the access panel on the conduit junction box and attach it to the raceway opening using the supplied hardware.

NOTE: To minimize the risk of damage to the fiber optic cables, allow ample slack in these cables so any bending radius is no less than 2 inches.

14. Run all the 1088/HO83 cabling through the longer extension of the conduit junction box. Run the DTS1 cabling through the shorter extension. Install all gaskets and covers on the raceway and conduit junction box.
15. Pull the DTS1 cabling through its flexible conduit and the 1088/HO83 through its separate flexible conduit. Attach these conduits to their respective sensor enclosures.
16. Re-connect the 1088/HO83 power and fiber optic cables to their appropriate terminal locations.

17. At the DTS1, perform the wiring connections as outlined on pages 13 and 14 of the *DTS1 User's Guide*. Omit the red and yellow wire heater connections referenced on page 14 of the *DTS1 User's Guide*.

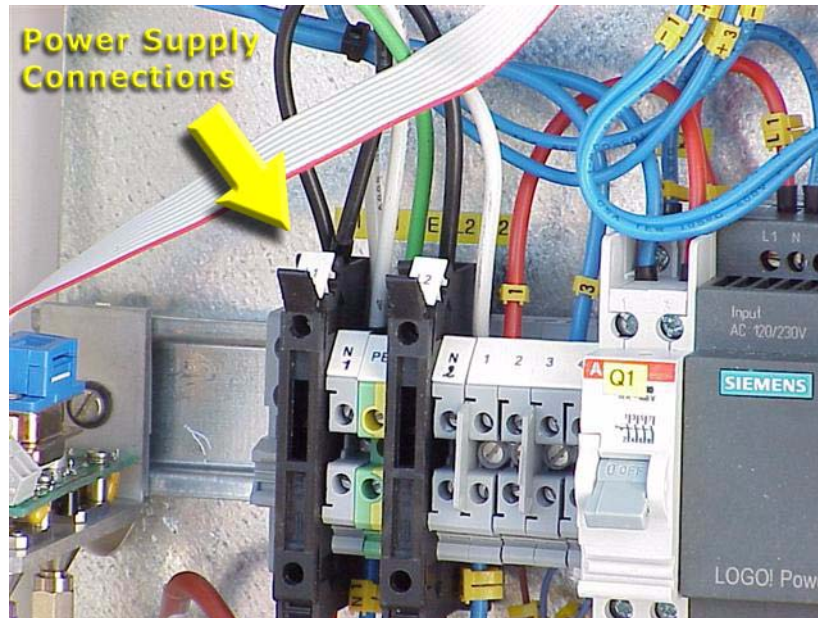


Figure 6. Power Connections

18. Using 18 gauge white and black wires, make two 4-inch long jumpers and install them between the positions on the DTS1 terminal block as illustrated in Table 1.

Table 1

Wire Color	Terminal ID
Black	L1 to L2
White	N1 to N2

19. On the fiber optic module inside the DTS1, closely examine the number of leads between the fiber optic circuit board and the connector barrels. The connector barrel with 2 leads going into it is the transmit side, the connector barrel with 3

leads going into it is the receive line. Install the fiber optic cables to their respective connector barrels. Refer to Figure 7.

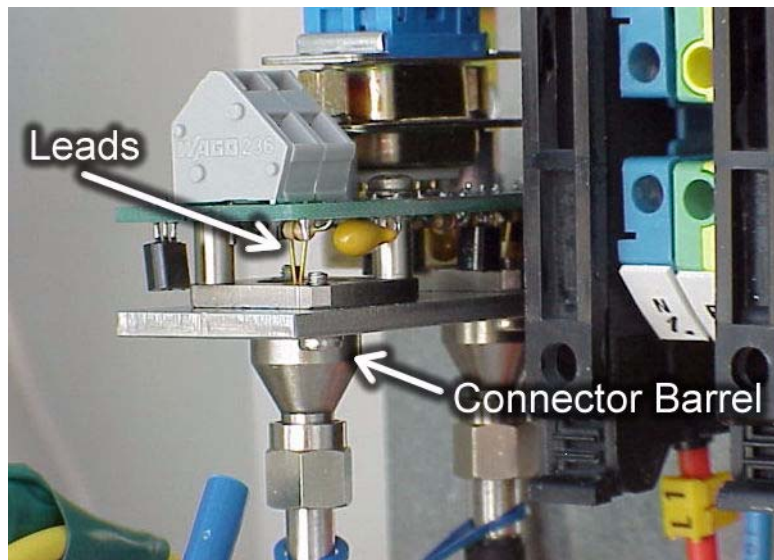


Figure 7. DTS1 F/O Connections

20. Attach the copper grounding wire to the bottom of the DTS1, refer to Figure 8. Attach the opposite end of the grounding wire near the same grounding location as the 1088/HO83.



Figure 8. Grounding Wire

21. **For DCP Installations**, install the circuit breaker module in the next available position on the circuit breaker rack (2A1A3).

For SCA Installations, locate the next unused circuit breaker position. Remove the circuit breaker panel (7A1A1A3) from the SCA back plane and install the new

circuit breaker using the hardware provided. Attach the the gray and white wires associated with the new circuit breaker location to the appropriate circuit breaker connectors. Reattach the circuit breaker panel.

22. Install the new fiber optic module in the next available slot on the Faraday Box.
23. Connect the corresponding SIO port to the newly installed fiber optic module. Refer to Table 3.4.1 (Page 3-38) and Figure 3.4.6 (Page 3-49) in the *Site Technical Manual* or Attachment B to this modification note for SIO and F/O module assignments.
24. Connect the fiber optic cables from the DTS1 to the newly installed fiber optic module.
25. Connect the wires listed in Table 2 coming from the DTS1 to the terminal strips inside the Faraday Box corresponding to the position of the newly installed circuit breaker:

Table 2

DTS1 Wire Color	AC and DC Power Distribution
Black	AC Hot
White	AC Neutral
Green	Ground

NOTE: For additional wiring and configuration help, refer to Attachment B of this modification note.

26. By default, the second half of the circuit breaker rack (the right side) is not powered. If installing this dewpoint sensor necessitates a circuit breaker to be installed on this “non-powered side,” then lower the circuit breaker. Using spare pieces of 14 AWG wire roughly 6 inches long, install these wires as indicated in Table 3:

Table 3

Wire Color	From	To
White	A1A4-18D	A1A4-21D
If 18D and 21D are too crowded to insert another wire, than this same electrical connection can be made between:		
White	A1A4-17A	A1A4-20A
Black	A1A4-12C	A1A414C

27. Before current can flow to the DTS1, the DCP must get a download from the ACU. This can be performed by one of the following methods:

a. Laptop Method

- (1) Restore power to the DCP/SCA and ensure the 1088/HO83 is functioning properly.
- (2) Connect a laptop up to the DCP as local OID, as explained in Paragraph 3.3.4 in the *ASOS Site Technical Manual*. Proceed to the Processor Status Screen (MAINT-PROC) and command a RESET of the DCP HARD field.

b. DCP Memory Board Method

- (1) Pull the DCP memory board, 2A1A2A3, and remove the J34 jumper from the memory board for at least five minutes. This will allow the memory chips to completely drain. Refer to Figure 9.

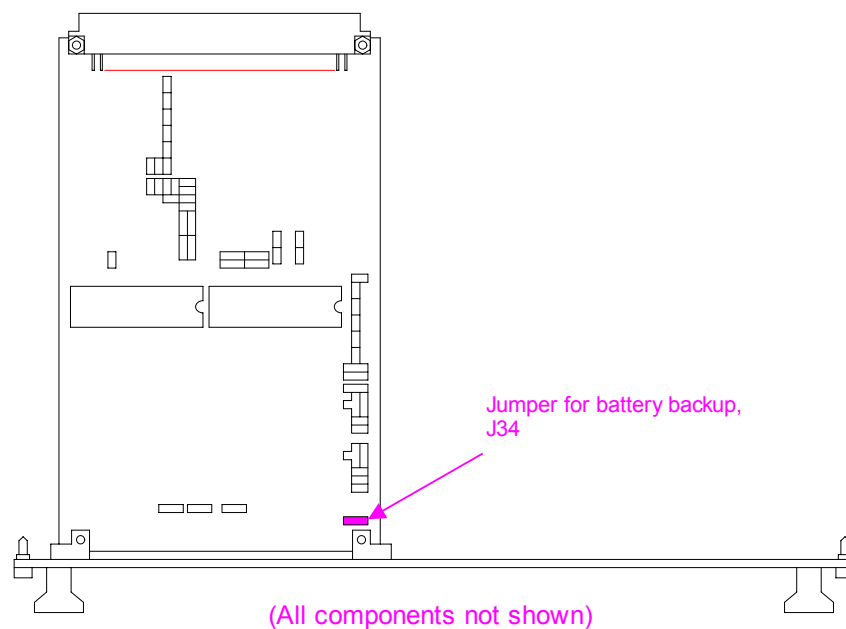


Figure 9. DCP Memory Board

- (2) Reinstall the memory board. Restore power to the DCP/SCA and ensure the 1088/HO83 is functioning properly.

c. Primary OID Method

- (1) Restore power to the DCP/SCA and ensure the 1088/HO83 is functioning properly.
- (2) At the primary OID, log onto the ASOS and proceed to the Processor Status Screen (MAINT-PROC) and command a RESET of the DCP HARD field.

28. Check for 115 VAC on the AC/DC Distribution Block inside the Faraday Box for the lines running to the DTS1.

29. Close the Faraday Box.
30. Switch the DTS1 circuit breaker on and turn the power switch on inside the DTS1.
31. At the DTS1, check for 24 VDC across either of the positive and negative posts on the upper right-hand corner of the 24 volt power supply.

NOTE: The thermostat located inside the DTS1 must remain at the factory default of 60 degrees, do NOT adjust. Refer to Figure 10.

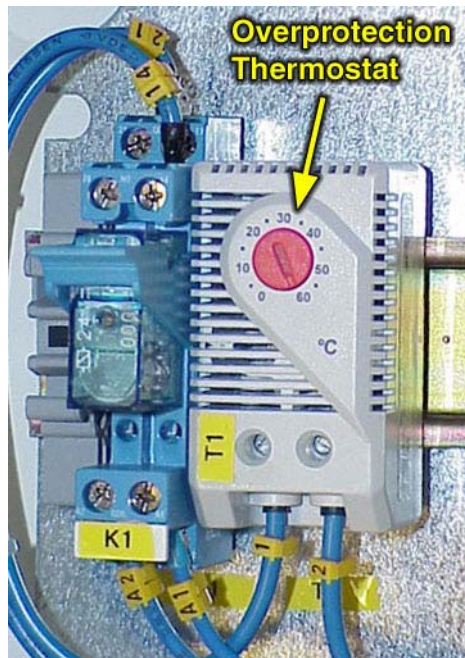


Figure 10. Thermostat

32. Close the DTS1, 1088/HO83, and the DCP/SCA.

PART 4 - Sensor Configuration

1. **For SCA Installations** - Perform Part 2 of this Modification Note then return to Part 4, step 2.
2. At the OID, log onto the system as a technician and proceed to the Processor Status Page (MAINT-PROC). Command a RESET of the DCP HARD field.
3. Proceed to the 12-Hour Test Sensor Page (REVUE-SENSR-12HR-TEST). After a minute or two, 1-minute readings from the 1088/HO83 will display in brackets on this page.
4. Proceed to the AOMC Page and command an upload of the CONFIG Pages.

5. Make a note in the SYSLOG (MAINT-ACT-FMK) that FMK Mod 75 has been completed and clear any fail flags as a result of powering down the DCP.

PART 5 - Reporting Modification

Target date for completion of this modification is as soon as possible upon receipt of this modification note. Proceed to the Engineering Management Reporting Systems (EMRS) webpage and enter Maintenance Reporting through the EMRS Web Portal. Contact Mike Brown at (301) 713-1892 x143 for further assistance.

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Attachment A - Test Sites
Attachment B - Example Configuration
Attachment C - Specific Site Configurations

Attachment A

Site ID	Region	City, State	Cabinet Type
BRW	Alaska	Barrow, AK	DCP
FAI	Alaska	Fairbanks, AK	DCP
BIS	Central	Bismark, ND	DCP
CNK	Central	Concordia, KS	DCP
MDW	Central	Chicago, IL	DCP
DCA	Eastern	Washington D.C.	DCP
DMH	Eastern	Baltimore, MD	SCA
GFL	Eastern	Glens Falls, NY	DCP
PWM	Eastern	Portland, ME	DCP
ITO	Pacific	Hilo, HI	DCP
ATT	Southern	Austin, TX	ACU
CSM	Southern	Clinton, OK	DCP
GUY	Southern	Guymon, OK	SCA
MIA	Southern	Miami, FL	DCP
MOB	Southern	Mobile, AL	DCP
AST	Western	Astoria, OR	DCP
BOI	Western	Boise, ID	DCP
CZZ	Western	Campo, CA	SCA
PHX	Western	Phoenix, AZ	DCP
SFO	Western	San Francisco, CA	DCP
SLC	Western	Salt Lake City, UT	DCP
SNT	Western	Stanley, ID	SCA
UAO	Western	Aurora, OR	ACU

Attachment B

The following table is provided as an example of the convention used when a new sensor is added to ASOS.

For example, if the DTS1 will be plugged into the eighth sensor slot, then it's corresponding circuit breaker module will plug into A9 on the circuit breaker rack. Likewise, the fiber optic module for the sensor should connect to SIO Port 3-1 and the sensor power connections will be made on row 10 of the terminal strips inside the Faraday Box.

Sensor #	Circuit Breaker	SIO Port	Fiber Optic DB-9 Connector	AC/DC Terminal Strip
1	2A1A3A2 (heat)	1-2	W15P6/A3A1J1	A17-3 & A18-3
2	2A1A3A3 (heat)	1-3	W15P7/A3A2J1	A17-4 & A18-4
3	2A1A3A4 (heat)	1-4	W15P8/A3A3J1	A17-5 & A18-5
4	2A1A3A5 (heat)	2-1	W15P9/A3A4J1	A17-6 & A18-6
5	2A1A3A6	2-2	W15P10/A3A5J1	A17-7 & A18-7
6	2A1A3A7	2-3	W15P11/A3A6J1	A17-8 & A18-8
7	2A1A3A8	2-4	W15P12/A3A7J1	A17-9 & A18-9
8	2A1A3A9	3-1	W15P13/A3A8J1	A17-10 & A18-10
9	2A1A3A11 (heat)	3-3	W15P14/A3A9J1	A17-11 & A18-11
10	2A1A3A12 (heat)	3-4	W15P15/A3A10J1	A17-12 & A18-12
11	2A1A3A13 (heat)	4-1	W15P16/A3A11J1	A17-13 & A18-13
12	2A1A3A14 (heat)	4-2	W15P17/A3A12J1	A17-14 & A18-14
13	2A1A3A15	4-3	W15P18/A3A13J1	A17-15 & A18-15
14	2A1A3A16	4-4	W15P19/A3A14J1	A17-16 & A18-16
15	2A1A3A17	5-1	W15P20/A3A15J1	A17-17 & A18-17
16	2A1A3A18	5-2	W15P21/A3A16J1	A17-18 & A18-18

Attachment C**Table 1. Sites Requiring Additional SIO Cards**

Region	Org Code	Site IDs
Alaska	WV9261	AQT, AWI, BIG, BRW, BTT, EAA, ENN, FAI, KAL, ORT, SCC, TAL
	WV9381	ANN, HNS, JNU, KTN, SGY, SIT
	WV9903	ADQ, AKN, ANC, BET, CDB, CDV, ENA, GKN, HOM, ILI, KVL, MCG, OME, OTZ, PAQ, SNP, SOV, SWD, TKA
Central	WR9423	BWG, FFT, LOU, SDF
	WR9438	BMG, EYE, GEZ, HUF, IND, LAF, MIE
	WR9450	AAO, CFV, CNU, HUT, ICT, PPF, RSL, SLN, WLD
	WR9465	ITR
	WR9469	AKO, DEN, LIC
	WR9476	CNY, EEO, RIL, VEL
	WR9534	BEH, FWA, GSH, SBN
	WR9546	DSM
	WR9553	FNB, LNK, OMA, TQE
	WR9562	IML, LBF
	WR9564	AIA, CDR, CYS, DGW
	WR9576	BYG, CPR, RIW, RKS, RWL
	WR9610	TVC
	WR9643	EAU
	WR9645	AUW
	WR9651	FSD, HON, RWF
	WR9658	FCM, MIC, MSP, STP
	WR9659	ATY, MBG, PIR
	WR9662	CUT, GCC, IEN, PHP, RAP, SFD
	WR9745	ASX, BRD, DLH
	WR9750	AXN, BDE, FAR, GFK, PKD
	WR9764	BIS, DIK, HEI, JMS
	WR9957	CGI, MDH, PAH, POF
	WR9971	COU, JEF, SET, STL, SUS, UIN

Table 1. Sites Requiring Additional SIO Cards (Continued)

Region	Org Code	Site IDs
Eastern	WN9307	EWN, HSE, MRH
	WN9509	AFN, BAF, MHT, ORE
	WN9528	BUF, DSV, ELZ, FZY
	WN9617	BTV, MPV, MSS, MVL, PLB, SLK, VSF
	WN9710	AOH, DFI
	WN9712	BGR, FVE, HUL, MLT
	WN9917	MGW, PIT
	WN9925	IPT
	WN9931	HGR, IAD, MRB
	WN9938	AUG, BML, DAW, HIE, IWI, IZG, LEB
Southern	WP9214	VLD
	WP9219	AHN, FFC, FTY, PDK
	WP9235	GLH, JAN, MEI
	WP9240	AEX, ARA, ESF
	WP9250	PIL
	WP9253	BMQ
	WP9259	FTW
	WP9263	JCT, SJT
	WP9325	CHA, TYS
	WP9327	BNA, CKV, CSV
	WP9334	HKA
	WP9363	BGD
	WP9919	BTR, MCB
	WP9933	CDS, LBB
	WP9957	MGM

Table 1. Sites Requiring Additional SIO Cards (Continued)

Region	Org Code	Site IDs
Western	WT9375	FLG, GCN, INW, PGA, SJN
	WT9389	MCE
	WT9488	LOL, TVL
	WT9578	BYI, IDA, LLJ, PIH, RXE
	WT9597	MHS, SIY, SXT
	WT9677	BHK, BIL, LVM, MLS
	WT9681	BKE, BNO, JER, ONO, TWF
	WT9698	EUG, MMV, PDX, SLE, SPB, UAO
	WT9768	GGW, OLF
	WT9773	BTM, MLP, MSO
	WT9785	EAT, MWH, PUW
	WT9903	EKO
	WT9914	BLU, RDD
	WT9922	BFI, BLI, CLM, FHR, HQM, OLM, PAE, RNT, SHN, SMP, TIW, UIL
	WT9932	BCE, CDC, LGU, MLF, OGD, PUC, SLC
	WT9950	BZN, CTB, DLN, GTF, HLN, LWT

Table 2. Sites Requiring Additional A/D Cards

Region	Org Code	Site IDs
Central	WR9553	OFK
	WR9562	VTN
	WR9564	BFF
	WR9658	STC
	WR9764	ISN
Eastern	WN9414	BKW
	WN9712	CAR
	WN9938	CON
Southern	WP9334	TUP
Western	WT9278	PHX
	WT9698	AST
	WT9773	FCA
	WT9903	ELY, WMC
	WT9950	HVR